

This lesson is part of a larger, comprehensive school garden guide called **Minnesota School Gardens: A Guide to Gardening and Plant Science** developed by Minnesota Agriculture in the Classroom in 2013. The entire guide is available at www.mda.state.mn.us/maitc.



Grade

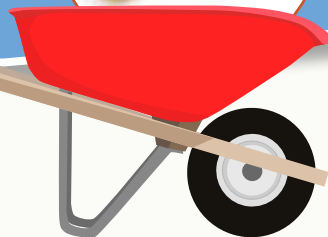
Elementary K-5

Materials/Preparation

- ☐ Handout A – Water Experiment – one per student
- ☐ Four potted plants or garden plants of the same type
- ☐ Water variable as needed for experiment
- ☐ Notebook paper
- ☐ Writing instruments

Fun Fact

The world's largest French fry feed is held every year in Grand Forks, North Dakota during Potato Bowl USA. In 2006, a new world record was set with 4,620 pounds of French fries served at the French Fry Frenzy. About 10,000 people were served. About 113 gallons of ketchup were used, too!



Why Plants Need Water

Minnesota K-12 Academic Standards

Science	0.1.1.2	Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.
	2.1.1.2	
	3.1.1.2	
	5.1.1.2	
Science	0.4.2.1	Natural systems have many components that interact to maintain the system.
	1.4.2.1	
	2.4.2.1	
	5.4.2.1	

Summary/Overview

Students compare their need for water to that of plants. They learn why plants need water and how to properly water garden plants. Finally, they assist in an experiment and observe the effects of water on four potted plants in the classroom.

Garden Connection

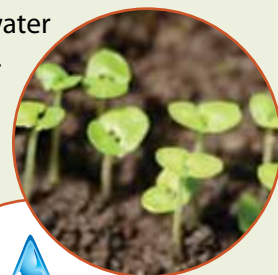
Garden plants lose water through evaporation and transpiration. These events require gardeners to closely monitor the amount of water available to their plants.

Background Information

Without water plants would not survive. Plants use water to create food through the process of *photosynthesis*. They also use water during transpiration to help cool off on hot days. Water helps plants maintain their strength and shape. Nutrients are transported from the roots to the stem and leaves of the plant with help from water. Plants that do not get enough water are at higher risk for getting sick and are less likely to be healthy and productive.

Because water is so vital to plants, it is important that plants are watered correctly. Plants need water on a regular basis.

Sometimes it comes from rain and sometimes it needs to be provided by humans. Plants that lack water will look limp and do not stand upright. Plants absorb water through their roots. When watering, be sure to aim the water at the base of the plant rather than at the leaves. Water a plant and then give it some time for the water to soak into the soil. Come back approximately 15 to 20 minutes later and water again. This allows the water to soak deep into the soil. After watering, push your finger into the soil to ensure it is moist down to the tip of your finger. Use high-quality water that is not contaminated with chemicals and other items that would be harmful to the plant. Let the soil dry out between waterings to avoid mold and fungus growth.



Objectives

- Explain the importance of water to plants.
- Describe how to properly water plants.
- Make a prediction about the plants in the class experiment.

Procedure

Interest Approach

Ask students what happens to them when they come in from recess or finish playing in the gym. During their physical exercise, their body has been working, getting hot, and sweating. This makes us thirsty. The hotter the day or the more active the exercise, the more water is needed. The same is true for plants. When they are outside on a hot day they need water. On extra hot or very windy days, water is required more often.

Summary of Content and Teaching Strategies

Discuss why water is important to plants: photosynthesis, transpiration, nutrient transport, strength, turgor pressure, and overall health. (Turgor pressure keeps the plasma membrane pushed against the cell wall and is critical for rigidity.) Discuss and demonstrate how to properly water garden plants. It needs to be done regularly, at the base of the plant, giving time for the water to soak in. Let the soil dry out between waterings and use quality water.

Develop an experiment with your students that helps them see water's effect on plants. Follow the steps outlined below.

1. Get four of the same type of potted plant, or identify four of the same plants in the garden.
2. Select a variable
 - a. types of water (hard water, soft water, rain water ...)
 - b. frequency of watering (every day, every two days, every three days ...)
 - c. amount of water (1/2 cup, 1 cup, 2 cups ...)

3. In this experiment, the control will be the plants' environment including sun, soil, and temperature. Make sure all plants in the experiment are in the same location receiving the same amount of sunlight and temperature and have the same soil.
4. Assist the students in developing a hypothesis. What do they think will happen?
5. Conduct the experiment watering as needed for your selected variable. Have students observe plant growth over the next two to four weeks.
6. At the end of the experiment, revisit the hypothesis and compare it to the actual results. If desired, have students fill out the lab report found on Handout A during the experiment.

Review/Summary

Ask the students the following questions:

- Why do plants need water?
- What happens to plants if they do not get enough water?
- How should plants be watered?
- What do you think will happen to the plants in the class experiment?

Modifications/Extensions

Make watering cans to use in the garden. Ask students to bring an empty milk jug or laundry detergent bottle with cap to school. An adult should carefully poke holes in the cover with the end of a scissors or a hot nail. Students can decorate their containers with permanent markers. Fill the jug or container with water, secure the cap and sprinkle away.

Explore turgor pressure in carrots. Before the activity, allow a bunch of carrots to dry out on the counter for a few days. Have students examine the dried-out carrots. Ask if they look tasty. Place half of the carrots in a container of water. After the carrots soak for an hour or so, examine them again. Compare the dried-out carrots to the ones soaking in water. Do students see a difference? The dried-out carrots have a low turgor pressure while the ones soaking have a higher pressure.

Sources/Credits

This lesson was developed for the *Minnesota Garden Guide*.

Name _____



Water Experiment

During this experiment you will observe the importance of water to plants.

1. Name the variable you are testing _____

2. List the treatments each plant will receive.

Plant one	Plant Two	Plant Three	Plant Four

3. Explain how often and how much the plants will be watered.

4. What do you think is going to happen? List your hypothesis.

5. Observe your plants over the next couple of weeks. Use the back of this paper to write down what you observe each week.

6. What do the plants look like at the end of the experiment? Compare the actual results with your hypothesis. Were you correct?

7. Why do you think the plants reacted the way they did?

Weekly Observations